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# **CCSDS Mission Operations Action Service Core Capabilities**

## **Manned Space Flight**

**Steve Lucord**



# Operations Concepts

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- Consequences of sending the wrong command (action) are unacceptable
- Command provides a collaborative and distributed work environment for flight controllers and operators.
- Command prescribes a review and approval process where each command is viewed by other individuals before being sent to vehicle.



# Introduction

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- The Action Service needs additional capabilities to support the operations concepts of manned space flight.
  - Action Service methods
  - Action attributes
  - Action parameter/argument attributes
  - Support for dynamically maintained action data.
  - Publish-subscribe capabilities
- OTF may provide necessary support for any modifications.



# Static Action Data

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Action Attributes				
Action Identifier	Description	Severity	Default Safe State	Default Safe Group

Action Parameter Attributes						
Parameter Identifier 1	Action Identifier	Description	Data Type	Engineering Units	Lower Limit	Upper Limit
Parameter Identifier N	Action Identifier	Description	Data Type	Engineering Units	Lower Limit	Upper Limit



# Dynamic Action Data

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Action Instance					
Instance Identifier	Action Identifier	Safe State	Armed State	Safe Group	Time Trigger

Action Instance Parameter		
Parameter Identifier 1	Instance Identifier	Value
Parameter Identifier N	Instance Identifier	Value



# Action Service Methods

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- preCheckAction
  - No corresponding capability in operations concept based on current definition
  - May need the capability to return the formatted data packet of what would be sent to the vehicle if action was invoked.
- invokeAction
  - Provides a fraction of required capabilities in the operations concepts.
  - Needs capability to specify a time trigger to indicate when action will execute on board the vehicle.



# Action Attributes

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- Additional Action Attributes
  - Enabled/Inhibited state. No command (action) may be invoked in the inhibited state.
  - Arm/Disarm state. A command (action) must be put in the armed state before being invoked. Only enabled commands may be armed.
  - Owner. A command (action) maintains the position that is allowed to perform the invoke.



# Action Parameter Attributes

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- Parameter Attributes
  - Parameter type. For example, string, integer or floating point.
  - Engineering Units.
  - Upper and Lower operational limits.



# Action Instances

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- Pre-built Instance
  - All parameter arguments are constant values
  - Each instance is assigned a unique identifier at initialization of the Action Service.
  - Time trigger application dynamically creates new pre-built instance of the action. A unique identifier for the instance is assigned.
  - Each instance maintains its own safe and armed state.



# Action Instances

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- User-built Instance
  - User-built instances are dynamically created, replaced or deleted by the user.
  - A unique identifier is assigned to each user-built instance at creation time.
  - User provides parameter arguments when the instance is created or replaced.
  - Time trigger application dynamically creates new user built instance or may be applied at creation time.
  - Each user-built instance maintains its own safe and armed state.



# Invoke Action

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- Invoke Pre-Built Action Instance
  - The unique identifier is provided as an argument to the invoke action event.
  - The user may provide the time trigger as an additional argument to the invoke action event.
  - The time triggered is applied to the data packet that is sent to the vehicle; however, it is not maintained as part of the pre-built instance data.



# Invoke Action Continued

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- Invoke User-Built Action Instance
  - The unique identifier is provided as an argument to the invoke action event.
  - The user may provide the parameter values as event arguments. The arguments are applied to the data packet that is sent to the vehicle; however, a user-built instance is not created.
  - The user may provide the time trigger and parameter values as event arguments. The same rules as before apply.
  - The user may provide the unique identifier and time trigger as event arguments. The time trigger is applied to the data packet that is sent to the vehicle but is not maintained as part of the user-built instance attributes.



# Action Packages

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- Action packages consist of one or more action instances. The data for each command is formatted into one data packet that is sent to the vehicle.
- Action package may be created or deleted. A unique identifier is assigned at creation time.
- Action instances may be added or removed from a packet.
- The order of the instances within a package may be changed.
- The unique package identifier is provided as an event argument to invoke an action package.



# Safe Groups

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- Safe groups permit the safe state of multiple action instances to be modified with one event.
- A safe group contains the name, description and safe state attributes along with a list of the action instances.
- Action instances may be added or removed from a safe group.
- A user may change the safe state (Enabled/Inhibited) of a group to Enabled. All the action instances in the group are set to the specified value.



# Additional Action Service Methods

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- Actions

- buildAction: This method creates a user-built instance of an action. The parameter arguments and time trigger may be provided.
- replaceAction: This method replaces the parameter arguments and or time trigger for a user-built instance.
- deleteAction: This method deletes a user-built or pre-built instance with a time trigger.
- setActionTimeTrigger: This methods sets the execution time for a pre-built or user-built instance of an action.



# Additional Action Service Methods

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- Action Package

- createActionPackage: This method creates an action package. The instances to add may be provided as arguments.
- replaceActionPackage: This method replaces an existing action package. The action instances may be provided as arguments to add, delete or change the order.
- deleteActionPackage: This method removes an existing action package.
- invokeActionPackage: This method sends the action package contents to the vehicle



## Additional Action Service Methods

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- createSafeGroup: This method creates a new safe group. The name and description are provided.
- updateSafeGroup: This method changes the state of the safe group. The state of the action instances in the group are modified. The name and description may be updated also.
- deleteSafeGroup: This method deletes a safe group.
- addSafeGroupAction: This method adds a new action instance to an existing safe group.
- removeSafeGroupAction: This method removes an action instance from an existing safe group.



# Monitoring Action State

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- Registration for the static Action Definition data is necessary.
  - Filter on Owner
- Pub-sub is necessary for the dynamic data that is maintained for the action instances.
  - Filter on the Enabled/Inhibited state
  - Filter on the Arm/Disarm state
  - Filter on Owner
- Pub-sub is needed for the dynamic action packet data
- Pub-sub is needed for the dynamic safe group data.



# Conclusions

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- Action Service needs additional capabilities to support manned space flight operations.
- Modifications may be added to the Core Services Blue Book or a separate blue book may be created
- OTF may provide necessary support



# Contacts

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- Project Sponsors
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# Thank You

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- Questions

CCSDS Mission Operations  
Action Service Demonstration

Screen Shots

### 1. L3 In Control Status Frame Display

InControl-NextGeneration - Control Frame									
File Displays Users Execute Window System Tools Help									
<b>AWE Display</b>									
<b>File</b>	<b>Edit</b>	<b>Acknowledge</b>	<b>Tools</b>						
Time	Source	Type	Application	Message					ACK.
2009/02/22 15:50:53.324	CEV	CMD	external	DSL1101 Stop Local Displays transmitted: 0013 0400 0000 8226 8000 0000 0000 0000 0002 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000					
2009/02/22 15:51:58.147	CEV	CMD	external	DSL1001 Start Local Displays transmitted: 0013 0400 00A0 81F4 B000 0000 0000 0000 0003 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000					
2009/02/22 15:51:58.158	CEV	CMD	external	CMD02001 set to 2					
2009/02/22 15:52:14.694	CEV	CMD	external	DSL1101 Stop Local Displays transmitted: 0013 0400 00A0 8226 8000 0000 0000 0000 0004 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000					
2009/02/22 15:52:25.079	CEV	CMD	Commanding	Command Not Found: DSL1102 in the database					
2009/02/22 16:03:18.514	CEV	ACK	AweManager	Acknowledged all messages					
<b>Fleet Status View</b> <div style="display: flex; justify-content: space-around;"> <span>CEV None</span> <span>CLV None</span> <span>ISS None</span> </div>									
<b>Resource View</b> <ul style="list-style-type: none"> <li>MCC</li> <li>-&gt; CEV             <ul style="list-style-type: none"> <li>-&gt; Applications                 <ul style="list-style-type: none"> <li>AWE</li> <li>OOL</li> <li>Procs</li> <li>Services</li> <li>Tasks</li> </ul> </li> <li>CLV</li> <li>ISS</li> </ul> </li> <li>-&gt; Global Applications             <ul style="list-style-type: none"> <li>-&gt; Domain Services                 <ul style="list-style-type: none"> <li>AWE</li> <li>Desktop Applications</li> </ul> </li> </ul> </li> </ul>									
<div style="text-align: center;"> </div> <div style="display: flex; justify-content: center; gap: 10px;"> <span>Fleet</span> <span>CEV</span> <span>CLV</span> <span>ISS</span> </div>									
<b>OOL Display</b>									
<b>File</b>	<b>Edit</b>	<b>Acknowledge</b>	<b>Limits</b>						
Time	Source	Parameter	Name	Value	CWD	Units	Violated Limit	ACK	
<b>Alarm</b>									
<b>Warning</b>									
Critical:0		Warning:0							
									admin   MCC System Administrator   2009/02/22 16:03:24.95

## 2. L3 In Control Hardware Connection Display

InControl-NextGeneration - Control Frame

File Displays Users Execute Window System Tools Help

AWE Display

File Edit Acknowledge Tools

Time	Source	Type	Application	Message	ACK
2009/02/22 15:31:46.894	ISS	SYS	Service Mgr	GlobalDataServer started	
2009/02/22 15:31:47.756	ISS	SYS	Service Mgr	TableManagement started	
2009/02/22 15:31:47.971	ISS	SYS	Service Mgr	TaskScheduler started	
2009/02/22 15:32:39.093	ISS	SEC	SecurityService	admin has joined ISS as role System Administrator from 14	
2009/02/22 15:38:01.946	ISS	SEC	SecurityService	admin has joined ISS as role System Administrator from lance	
2009/02/22 15:38:36.151	CEV	ACK	AweManager	Acknowledged all messages	
2009/02/22 15:38:36.189	ISS	ACK	AweManager	Acknowledged all messages	
2009/02/22 15:38:36.185	CLV	ACK	AweManager	Acknowledged all messages	
2009/02/22 15:38:36.194	MCC	ACK	AweManager	Acknowledged all messages	

Fleet Status View

CEV CLV ISS

Resource View

- MCC
- CEV
  - Applications
    - AWE
    - OOL
    - Procs
    - Services
    - Tasks
- CLV
- ISS
  - Global Applications
  - Domain Services
  - AWE
  - Desktop Applications

CEV Hardware Connection Display

File Acknowledge

C31 BBU NetMAC SMC

Unit Name	Gateway	Connect Status	Select Status	Connect Action	Select Action
CEV_Command	All	Connected	Selected		
CEV_Command	Command				
CEV_Telemetry	All	Disconnected	Deselected		
CEV_Telemetry	Telemetry				

Apply

Fleet CEV CLV ISS

OOL Display

File Edit Acknowledge Limits

Time	Source	Parameter	Name	Value	CWD	Units	Violated Limit	ACK
Alarm								
Warning								
Critical:0								
Warning:0								
admin [MCC System Administrator] 2009/02/22 15:41:40.317								

### 3. L3 In Control Manual Commanding Display

InControl-NextGeneration - Control Frame

File Displays Users Execute Window System Tools Help

AWE Display

File Edit Acknowledge Tools

Time	Source	Type	Application	Message	ACK
2009/02/22 15:49:36.987	CEV	CMD	external	CMD02001 set to 1	
2009/02/22 15:50:53.324	CEV	CMD	external	DSL1101 Stop Local Displays transmitted: 0013 0400 00A0 8226 8000 0000 0000 0000 0002 0000 0000 0000 0000	
2009/02/22 15:51:58.147	CEV	CMD	external	DSL1001 Start Local Displays transmitted: 0013 0400 00A0 81F4 8000 0000 0000 0000 0003 0000 0000 0000 0000	
2009/02/22 15:51:58.158	CEV	CMD	external	CMD02001 set to 2	
2009/02/22 15:52:14.694	CEV	CMD	external	DSL1101 Stop Local Displays transmitted: 0013 0400 00A0 8226 8000 0000 0000 0000 0004 0000 0000 0000 0000	
2009/02/22 15:52:25.079	CEV	CMD	Commanding	Command Not Found: DSL1102 in the database	

Fleet Status View

CEV CLV ISS  
None None None

Resource View

- MCC
- CEV
  - Applications
  - AWE
  - OOL
  - Procs
  - Services
  - Tasks
- CLV
- ISS
- Global Applications
- Domain Services
- AWE
- Desktop Applications

CEV Manual Commanding

File Edit Acknowledge Status

Selection Commanding File Commanding Raw Commanding

Id	Name	Subsystem
DSL1001	Start Local Displays	
DSL1101	Stop Local Displays	

Name Filter:

Command Search

Filter:

Selection:

Command Operation

Send To Stack  
Execute Command  
Clear Fields

Command Execution Status

Command ID	Command Name	Execution Time	Status	Application
Future				
Present				
Past				
DSL1001	Start Local Displays	2009/02/22 15:49:36.876	Completed CommandedState	external
DSL1101	Stop Local Displays	2009/02/22 15:50:53.308	Completed Transmit	external
DSL1001	Start Local Displays	2009/02/22 15:51:58.140	Completed CommandedState	external
DSL1101	Stop Local Displays	2009/02/22 15:52:14.684	Completed Transmit	external

Stack Operation

Stack To File  
Add Delay  
Execute Stack  
Clear Stack  
Suspend

CEV Hardware...

Fleet CEV CLV ISS

OOL Display

File Edit Acknowledge Limits

Time	Source	Parameter	Name	Value	CWD	Units	Violated Limit	ACK
Alarm								
Warning								
Critical:0								
Warning:0								

admin | MCC System Administrator | 2009/02/22 15:53:09.691

## 4. Action Service Directory Page

FileEditViewHistoryBookmarksToolsHelp

https://otf.jsc.nasa.gov/smc/action-service-client/directory-service.2Putman Tree Service

Getting StartedLatest Headlineshttp://Directory Listing For /services/...Directory Listing For /services/...Spacecraft Monitor and Control...Directory ServiceAction Service

### Spacecraft Monitor and Control - Action Service

Pages

Directory Service

[Command Inventory](#)

[Command History](#)

Domain	Network Zone	Session Type	Session Name	Area	Type	Version	Provider Name	Service URI
<input checked="" type="checkbox"/> gov.nasa.jsc.otf.action	GROUND	LIVE	Prototype	1	1	1	ActionService	jams:dd12.jsc.nasa.gov:SMCPi

Showing 1 to 1 of 1<< < 1 > >>

Domain: gov.nasa.jsc.otf.action

SelectRefresh

Domain gov.nasa.jsc.otf.action selected.

Operations Technology Facility SM&C Prototype [OTF](#)

[WICKET AJAX DEBUG](#)

Doneotf.jsc.nasa.gov

## 5. Action Service Inventory

FileEditViewHistoryBookmarksToolsHelp

https://otf.jsc.nasa.gov/smc/action-service-client/command-inventory.8Putman Tree Service

Getting StartedLatest Headlineshttp://Directory Listing For /services/...Directory Listing For /services/...Spacecraft Monitor and Control...Directory ServiceAction Service

### Spacecraft Monitor and Control - Action Service

**Pages**  
[Directory Service](#)  
[Command Inventory](#)  
[Command History](#)

Command ID	Name	System	
<input checked="" type="checkbox"/> DSIL1001	Start Local Displays	JSC	
<input type="checkbox"/> DSIL1002	Start Pitch RTI	JSC	
<input type="checkbox"/> DSIL1003	Start Master Sim	JSC	
<input type="checkbox"/> DSIL1004	Start Federates	JSC	
<input type="checkbox"/> DSIL1005	Start VSEE	JSC	

Showing 1 to 5 of 15<< < 1 2 3 > >>

Domain: gov.nasa.jsc.otf.actionCommand: DSIL1001  

☒ Invoke Action Completed for Command DSIL1001

Operations Technology Facility SM&C Prototype [OTF](#)

[WICKET AJAX DEBUG](#)

Doneotf.jsc.nasa.gov

## 6. Action Service History

FileEditViewHistoryBookmarksToolsHelp

https://otf.jsc.nasa.gov/smc/action-service-client/command-history.17Putman Tree Service

Getting StartedLatest Headlineshttp://Directory Listing For /services/...Directory Listing For /services/...Spacecraft Monitor and Control...Directory ServiceAction Service

### Spacecraft Monitor and Control - Action Service

Pages

[Directory Service](#)

[Command Inventory](#)

Command History

Command ID	Transaction ID	Invoke Time	Execution Time	Verification Stage	Verification State	Alert
DSIL1102	0000003	2009-02-22 09:52:25.030	2009-02-22 09:52:25.111	RELEASE		Command not found in
DSIL1101	0000002	2009-02-22 09:52:14.614	2009-02-22 09:52:14.704	COMPLETION	PASSED	
			2009-02-22 09:52:14.703	EXECUTION	ASSUMED	
			2009-02-22 09:52:14.696	ACCEPTANCE	PASSED	
			2009-02-22 09:52:14.683	RECEIPT	PASSED	
			2009-02-22 09:52:14.678	RELEASE	PASSED	
DSIL1001	0000001	2009-02-22 09:51:58.020	2009-02-22 09:51:58.159	COMPLETION	PASSED	
			2009-02-22 09:51:58.154	EXECUTION	PASSED	
			2009-02-22 09:51:58.149	ACCEPTANCE	PASSED	
			2009-02-22 09:51:58.136	RECEIPT	PASSED	
			2009-02-22 09:51:58.131	RELEASE	PASSED	

Showing 1 to 11 of 11

Operations Technology Facility SM&C Prototype [OTF](#)

[WICKET AJAX DEBUG](#)

Doneotf.jsc.nasa.gov

## 7. Test Telemetry Displays

DET\_10\_2\_127.msk mskview

File Edit C3I Scale Font Logger Help

000/00:00:00

Expected

Actual

DET:10.2.12710.2.127

Data Record Group:sm\_peg\_recsm\_peg\_rec

Number Symbols:192192

Tlm Packet Length:15500

Meta Data Packet Length:3075430754

Tlm Delta Time:1.0000.000000

Time to Process Meta Data (msec):0.000000

Meta Data Time Stamp:Mon Feb 16 13:28:05 2009

Time to Process Tlm (msec):0.000000

Time Symbol:  
svs.exec.out.time sm\_peg\_rec  
sys.exec.out.time\_sm\_peg\_rec

Raw Packet (first 30 bytes):  
0?

symbol	length	type	value	timetac	units
cev_cm_veh.drpO.lzc[0]	64	float	M	000/00:00:00	--
cev_cm_veh.drpO.lzc[1]	64	float	M	000/00:00:00	--
cev_cm_veh.drpO.lzc[2]	64	float	M	000/00:00:00	--
cev_cm_veh.drpO.S_cmd_droop	32	2s comp	M	000/00:00:00	--
cev_cm_veh.drpO.S_drp_flash	32	2s comp	M	000/00:00:00	--
cev_cm_veh.drpO.lamC[0]	64	float	M	000/00:00:00	r
cev_cm_veh.drpO.lamC[1]	64	float	M	000/00:00:00	r
cev_cm_veh.drpO.lamC[2]	64	float	M	000/00:00:00	r
cev_cm_veh.drpO.lamdC[0]	64	float	M	000/00:00:00	r/s
cev_cm_veh.drpO.lamdC[1]	64	float	M	000/00:00:00	r/s
cev_cm_veh.drpO.lamdC[2]	64	float	M	000/00:00:00	r/s
cev_cm_veh.drpO.pred_droop_alt	64	float	M	000/00:00:00	ft
cev_cm_veh.drpO.rout	64	float	M	000/00:00:00	ft
cev_cm_veh.drpO.thrust_att	64	float	M	000/00:00:00	r
cev_cm_veh.drpO.tlamC	64	float	M	000/00:00:00	s
cev_cm_veh.drpO.tnew	64	float	M	000/00:00:00	s
cev_cm_veh.drpP.ft_s_ave	64	float	M	000/00:00:00	lbf
cev_cm_veh.drpP.gacc	64	float	M	000/00:00:00	ft/s2
cev_cm_veh.drpP.mdt	64	float	M	000/00:00:00	slugs/s
cev_cm_veh.drpP.peg_att	64	float	M	000/00:00:00	r
cev_cm_veh.drpP.peg_cmd[0]	64	float	M	000/00:00:00	--
cev_cm_veh.drpP.peg_cmd[1]	64	float	M	000/00:00:00	--
cev_cm_veh.drpP.peg_cmd[2]	64	float	M	000/00:00:00	--
cev_cm_veh.drpP.tv_horiz	64	float	M	000/00:00:00	lbf
cev_cm_veh.drpP.tv_max	64	float	M	000/00:00:00	lbf
cev_cm_veh.drpP.tv_vert	64	float	M	000/00:00:00	lbf
cev_cm_veh.drpP.vex_ave	64	float	M	000/00:00:00	ft/s
cev_cm_veh.drpP.vgdix	64	float	M	000/00:00:00	ft/s
cev_cm_veh.drpP.vgdiy	64	float	M	000/00:00:00	ft/s
cev_cm_veh.drpP.vgdiz	64	float	M	000/00:00:00	ft/s
cev_cm_veh.pegC.C1	64	float	M	000/00:00:00	--
cev_cm_veh.pegC.C2	64	float	M	000/00:00:00	--
cev_cm_veh.pegC.EFplaneSw	32	2s comp	M	000/00:00:00	--
cev_cm_veh.pegC.aLimit	64	float	M	000/00:00:00	ft/s2
cev_cm_veh.pegC.a[0]	64	float	M	000/00:00:00	--
cev_cm_veh.pegC.a[10]	64	float	M	000/00:00:00	--
cev_cm_veh.pegC.a[11]	64	float	M	000/00:00:00	--
cev_cm_veh.pegC.a[1]	64	float	M	000/00:00:00	--

DET\_10\_2\_1.msk mskview

File Edit C3I Scale Font Logger Help

000/00:00:00

Expected

Actual

DET:

10.2.1

10.2.1

Data Record Group:

cev\_isp\_c3i

cev\_isp\_c3i

Number Symbols:

172

172

Tlm Packet Length:

0

0

Meta Data Packet Length:

32713

32713

Tlm Delta Time:

1.000

0.000000

Time to Process Meta Data (msec):

0.000000

Meta Data Time Stamp:

Mon Feb 16 13:28:04 2009

Time to Process Tlm (msec):

0.000000

Time Symbol:

svs.exec.out.time cev\_isp\_c3i

sys.exec.out.time\_ cev\_isp\_c3i

Raw Packet (first 30 bytes):

0?

symbol	length	type	value	timetags	units
cev_cm_veh.aero.current.angle_of_sideslip	64	float	M	000/00:00:00	r
cev_cm_veh.aero.current.total_angle_of_attack	64	float	M	000/00:00:00	r
cev_cm_veh.atmos_rel.angle_of_attack	64	float	M	000/00:00:00	r
cev_cm_veh.atmos_rel.angle_of_sideslip	64	float	M	000/00:00:00	r
cev_cm_veh.atmos_rel.bank_angle	64	float	M	000/00:00:00	r
cev_cm_veh.atmos_rel.dynamic_pressure	64	float	M	000/00:00:00	N/M2
cev_cm_veh.atmos_rel.mach_number	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[0][0]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[0][1]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[0][2]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[1][0]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[1][1]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[1][2]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[2][0]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[2][1]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_body_inertial[2][2]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[0][0]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[0][1]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[0][2]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[1][0]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[1][1]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[1][2]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[2][0]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[2][1]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.T_structure_body[2][2]	64	float	M	000/00:00:00	--
cev_cm_veh.body.orbit.rot.body_rate[0]	64	float	M	000/00:00:00	r/s
cev_cm_veh.body.orbit.rot.body_rate[1]	64	float	M	000/00:00:00	r/s
cev_cm_veh.body.orbit.rot.body_rate[2]	64	float	M	000/00:00:00	r/s
cev_cm_veh.body.orbit.trans.inertial_pos[0]	64	float	M	000/00:00:00	M
cev_cm_veh.body.orbit.trans.inertial_pos[1]	64	float	M	000/00:00:00	M
cev_cm_veh.body.orbit.trans.inertial_pos[2]	64	float	M	000/00:00:00	M
cev_cm_veh.body.orbit.trans.inertial_vel[0]	64	float	M	000/00:00:00	M/s
cev_cm_veh.body.orbit.trans.inertial_vel[1]	64	float	M	000/00:00:00	M/s
cev_cm_veh.body.orbit.trans.inertial_vel[2]	64	float	M	000/00:00:00	M/s
cev_cm_veh.body.orbit.trans.nonconserv_accel[0]	64	float	M	000/00:00:00	M/s2
cev_cm_veh.body.orbit.trans.nonconserv_accel[1]	64	float	M	000/00:00:00	M/s2
cev_cm_veh.body.orbit.trans.nonconserv_accel[2]	64	float	M	000/00:00:00	M/s2
cev_cm_veh.body.orbit.trans.null_vector[0]	64	float	M	000/00:00:00	--

DET\_13.2\_1.msk mskview

File Edit C3I Scale Font Logger Help

000/00:00:00

Expected

Actual

DET:

13.2.1

13.2.1

Data Record Group:

clv\_intf

clv\_intf

Number Symbols:

89

89

Tlm Packet Length:

0

0

Meta Data Packet Length:

16184

16184

Tlm Delta Time:

1.000

0.000000

Time to Process Meta Data (msec):

0.000000

Meta Data Time Stamp:

Mon Feb 16 13:28:05 2009

Time to Process Tlm (msec):

0.000000

Time Symbol:

svs.exec.out.time clv\_intf

sys.exec.out.time\_clv\_intf

Raw Packet (first 30 bytes):

0?

symbol	length	type	value	timetad	units
clv_telem.stDSILTelemetry.stMissionManagerOut.dDeltaPitchFinal	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.dDeltaPitchInitial	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.dDtCurrentPhase	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iActiveChiTable	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iCtrlFlag	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iCurrent_flight_phase	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iECOArmFlag	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iEngineMode	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iGuidFlag	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iGuidePhase	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iJ2On	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iLASAbort	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iLASOn	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iMECOTargetIndex	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iPOBSMOn	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iPropFlag	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iRW_ID	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iSMOn	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iSRBOn	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iUllageJet	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iUllageOn	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.iVehFlag	32	2s comp	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[0].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[1].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[2].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[3].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[4].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[5].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[6].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[7].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[8].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stMissionManagerOut.phase[9].phaseDT	64	float	M	000/00:00:00	--
clv_telem.stDSILTelemetry.stNavigationOut.dAlpha	64	float	M	000/00:00:00	d
clv_telem.stDSILTelemetry.stNavigationOut.dAlt	64	float	M	000/00:00:00	ft
clv_telem.stDSILTelemetry.stNavigationOut.dBeta	64	float	M	000/00:00:00	d
clv_telem.stDSILTelemetry.stNavigationOut.dClockTime	64	float	M	000/00:00:00	s
clv_telem.stDSILTelemetry.stNavigationOut.dGST	64	float	M	000/00:00:00	r
clv_telem.stDSILTelemetry.stNavigationOut.dMach	64	float	M	000/00:00:00	--